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| 10/801,740 | 03/16/2004 | Kevin R. Keegan | 89190.115603/DP-310836 | 1846 |

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| EXAMINER |
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AKRAM, IMRAN

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| ART UNIT | PAPER NUMBER |
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1795

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01/23/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/801,740 | Applicant(s) KEEGAN ET AL. | |
| | Examiner Imran Akram | Art Unit 1795 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Rejection of claims 1-5 and 15-19 under 35 U.S.C. 101 found in office action dated 8/9/07 has been withdrawn in light of amendment filed 11/13/07.

Response to Arguments

2. Applicant's arguments filed 11/21/07 have been fully considered but they are not persuasive. The Yamaoka, Dalla Betta, and Grieve all retain relevance absent claim amendments for at least the following reasons.

3. Applicant argues that the Yamaoka reference fails to anticipate claim 6 for failure to determine a fuel combustion time interval. Examiner respectfully disagrees in light of further elaboration. While Yamaoka may not explicitly disclose calculating a time interval, its calculation is implicit (see MPEP § 2144.01). Yamaoka discloses a control device as recited in the abstract and quantity of fuel flow is compared with time as shown in figure 6. Reforming time would implicitly be calculated when using flow rates (flow per unit time).

4. Applicant argues that the Dalla Betta reference fails to teach the determination of a fuel combustion time interval. Examiner respectfully disagrees in light of further elaboration. While Dalla Betta may not explicitly disclose calculating a time interval, its calculation is implicit (see MPEP § 2144.01). Dalla Betta's disclosure of calculating the length of time of fuel reforming in rich mode (paragraph 101) does not preclude the significance and ability of Dalla Betta to implicitly calculate combustion time. If Dalla

Betta discloses the calculation of fuel amount by integrating with respect to time (paragraphs 93 and 95), calculating time when fuel rate is known would simply be a matter of known calculation, as well. Also, the rejection of claims using Dalla Betta is in combination with Yamaoka, not singularly without Yamaoka.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 6 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamaoka (US 2002/0071974).

6. Regarding claim 6, Yamaoka discloses a fuel reforming apparatus with an electronic control module for controlling the flow of hydrocarbon fuel and air into the reformer and determining a fuel combustion time interval for pre-heating from a starting temperature to a minimum reforming temperature (see abstract).

7. Regarding claim 7, Yamaoka discloses the use of a microcomputer (paragraph 39). Software constructs including algorithms, code modules, and interface specifications are inherent to all computers.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 1-5 and 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dalla Betta (US 2003/0101713) in view of Yamaoka (US 2002/0071974).

12. Regarding claims 1, 2, 10, 11, 15, and 16, Dalla Betta discloses the use of fuel type, flow rate, catalyst mass, heat of combustion, and initial temperature (paragraph 95) and other system constants (see paragraph 78 for heat capacity of the reformer mass) for use in length of time for fuel processing (paragraph 101) and preheating to a minimum reforming temperature (paragraph 52). And while Dalla Betta discloses the use of control systems, the reference does not disclose the details of a software construct, a computing system, or computer readable medium. Yamaoka discloses a method for controlling the flow of hydrocarbon fuel and air into a reformer and determining a fuel combustion time interval for pre-heating from a starting temperature to a minimum reforming temperature (see abstract). Yamaoka discloses the use of a microcomputer (paragraph 39). Software constructs including algorithms, code modules, and interface specifications are inherent to all computers, as are the computer readable medium located within them and with which they function. It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate software constructs and a computer for performing the control of Dalla Betta. Computers and their inherent software constructs are the most common methods for control in the art.

13. Regarding claims 3, 4, 12, 13, 17, and 18, Dalla Betta does not disclose the specifics of the function involving the various parameters. Yamaoka, however, discloses a linear function of temperature and flow rate (see figure 2) where y is the target temperature (combustion temperature) and b is the starting temperature (y -intercept). It would have been obvious to one having ordinary skill in the art at the time the invention

was made to have a software construct with a linear form since the heat of combustion and heat capacity and mass of the catalyst are all constant: If m is an integral of a product of the latent heat of combustion of said fuel times the selected flow rate of said fuel, divided by a product of the mass of said reformer to be heated times the heat capacity of said mass, the integral of these values with the flow rate of the combustion fuel is equal to the product of the latent heat of combustion divided by a product of the mass of said reformer to be heated times the heat capacity of said mass times the integral of the flow rate with respect to time (it is the only variable related to time). This also gives an x value that is the quantity of raw fuel flow, as the graph of figure 2 is labeled. The use of these variables as products and dividends as a slope converts the units of flow rate to the units of temperature with a value dependent upon the specific values of the gas and catalyst—obvious to a person of ordinary skill.

14. Regarding claims 5, 14, and 19, Dalla Betta discloses a reforming temperature of about 500°C (paragraph 54).

15. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaoka as applied to claim 6 above, and further in view of Dalla Betta.

16. Yamaoka discloses a linear function of temperature and flow rate (see figure 2) where y is the target temperature (combustion temperature) and b is the starting temperature (y -intercept). Yamaoka does not, however, disclose the details of the slope. Dalla Betta discloses the use of fuel type, flow rate, catalyst mass, heat of combustion, and initial temperature (paragraph 95) and other system constants (see paragraph 78 for heat capacity of the reformer mass) for use in length of time for fuel processing

(paragraph 101). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a software construct with a linear form since the heat of combustion and heat capacity and mass of the catalyst are all constant: If m is an integral of a product of the latent heat of combustion of said fuel times the selected flow rate of said fuel, divided by a product of the mass of said reformer to be heated times the heat capacity of said mass, the integral of these values with the flow rate of the combustion fuel is equal to the product of the latent heat of combustion divided by a product of the mass of said reformer to be heated times the heat capacity of said mass times the integral of the flow rate with respect to time (it is the only variable related to time). This also gives an x value that is the quantity of raw fuel flow, as the graph of figure 2 is labeled. The use of these variables as products and dividends as a slope converts the units of flow rate to the units of temperature with a value dependent upon the specific values of the gas and catalyst—obvious to a person of ordinary skill.

17. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaoka as applied to claim 6 above, and further in view of Grieve (US 2002/0150532).

18. Yamaoka discloses the use of a fuel cell, but does not disclose a solid oxide fuel cell. Grieve, however, does (paragraph 4). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a solid oxide fuel cell with Yamaoka as it would be capable of the same function as Yamaoka and is a common type of fuel cell readily available in the art.

Conclusion

19. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Imran Akram whose telephone number is 571-270-3241. The examiner can normally be reached on 10-7 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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SUPERVISORY PATENT EXAMINER